**SPEC CPU®2017 Integer Speed Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant ML30 Gen10
(3.60 GHz, Intel Xeon E-2234)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>10.6</th>
</tr>
</thead>
</table>

**Test Date:** Sep-2019

**Hardware Availability:** Nov-2019

**Software Availability:** May-2019

---

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>4</td>
<td>7.50</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>4</td>
<td>11.9</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>4</td>
<td>15.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>4</td>
<td>6.83</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>4</td>
<td>15.4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>4</td>
<td>17.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4</td>
<td>6.40</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4</td>
<td>5.78</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>4</td>
<td>21.0</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>4</td>
<td>8.94</td>
</tr>
</tbody>
</table>

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**Threads SPECspeed®2017_int_base (10.6)**

**Software**

**OS:** SUSE Linux Enterprise Server 15 (x86_64)

**Kernel:** 4.12.14-23-default

**Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++

**Compiler Build:** 20190416 for Linux;

**Fortran:** Version 19.0.4.227 of Intel Fortran

**Compiler Build:** 20190416 for Linux;

**Parallel:** Yes

**Firmware:** HPE BIOS Version U44 09/05/2019 released Nov-2019

**File System:** xfs

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** Not Applicable

**Other:** jemalloc memory allocator V5.0.1

**Power Management:** --

---

**Hardware**

**CPU Name:** Intel Xeon E-2234

**Max MHz:** 4800

**Nominal:** 3600

**Enabled:** 4 cores, 1 chip

**Orderable:** 1 chip

**Cache L1:** 32 KB I + 32 KB D on chip per core

**L2:** 256 KB I+D on chip per core

**L3:** 8 MB I+D on chip per chip

**Other:** None

**Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)

**Storage:** 1 x 400 GB SAS SSD, RAID 0

**Other:** None
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SPECspeed®2017_int_base = 10.6
SPECspeed®2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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</tr>
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<tbody>
<tr>
<td>600:perlbench_s</td>
<td>4</td>
<td>237</td>
<td>7.50</td>
<td>236</td>
<td>7.51</td>
<td>237</td>
<td>7.48</td>
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<td>602:gcc_s</td>
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<td>335</td>
<td>11.9</td>
<td>336</td>
<td>11.9</td>
<td>335</td>
<td>11.9</td>
</tr>
<tr>
<td>605:mcf_s</td>
<td>4</td>
<td>297</td>
<td>15.9</td>
<td>298</td>
<td>15.8</td>
<td>297</td>
<td>15.9</td>
</tr>
<tr>
<td>620:omnetpp_s</td>
<td>4</td>
<td>237</td>
<td>6.88</td>
<td>239</td>
<td>6.83</td>
<td>241</td>
<td>6.77</td>
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<tr>
<td>623:xalancbmk_s</td>
<td>4</td>
<td>91.6</td>
<td>15.5</td>
<td>92.0</td>
<td>15.4</td>
<td>92.6</td>
<td>15.3</td>
</tr>
<tr>
<td>625:x264_s</td>
<td>4</td>
<td>102</td>
<td>17.4</td>
<td>102</td>
<td>17.3</td>
<td>102</td>
<td>17.3</td>
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<tr>
<td>631:deepsjeng_s</td>
<td>4</td>
<td>224</td>
<td>6.40</td>
<td>224</td>
<td>6.39</td>
<td>224</td>
<td>6.40</td>
</tr>
<tr>
<td>641:leela_s</td>
<td>4</td>
<td>295</td>
<td>5.78</td>
<td>295</td>
<td>5.78</td>
<td>296</td>
<td>5.76</td>
</tr>
<tr>
<td>648:exchange2_s</td>
<td>4</td>
<td>140</td>
<td>21.0</td>
<td>141</td>
<td>20.9</td>
<td>140</td>
<td>21.0</td>
</tr>
<tr>
<td>657:xz_s</td>
<td>4</td>
<td>691</td>
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<td>8.94</td>
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<td>8.94</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes
Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
    sync; echo 3> /proc/sys/vm/drop_caches

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
    KMP_AFFINITY = "granularity=fine,scatter"
    LD_LIBRARY_PATH = "/home/cpu2017_u4/lib/intel64:/home/cpu2017_u4/je5.0.1-64"
    OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
(Continued on next page)
General Notes (Continued)


Platform Notes

BIOS Configuration:
Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetch set to Enabled
Workload Profile set to General Peak Frequency Compute

Sysinfo program /home/cpu2017_u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edc1e6e46a485a0011
running on ml30-sles15 Fri Oct 4 17:06:28 2019

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) E-2234 CPU @ 3.60GHz
  1 "physical id"s (chips)
  4 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 4
siblings : 4
physical 0: cores 0 1 2 3

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2234 CPU @ 3.60GHz
Stepping: 10
CPU MHz: 3600.000
BogoMIPS: 7200.00
Virtualization: VT-x

(Continued on next page)
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<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
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</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Sep-2019  
**Hardware Availability:** Nov-2019  
**Software Availability:** May-2019

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### Platform Notes (Continued)

- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 256K  
- **L3 cache:** 8192K  
- **NUMA node0 CPU(s):** 0-3  
- **Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tscknown_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xptr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single tpi tpr_shadow vmvi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsaves ibpb ibrs stibp dtherm ida arat pln pts ssbd

```
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 256K  
L3 cache: 8192K  
NUMA node0 CPU(s): 0-3  
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tscknown_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xptr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single tpi tpr_shadow vmvi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsaves ibpb ibrs stibp dtherm ida arat pln pts ssbd
```

---

From `numactl --hardware`  
WARNING: a numactl 'node' might or might not correspond to a physical chip.  
- available: 1 nodes (0)  
- node 0 cpus: 0 1 2 3  
- node 0 size: 64267 MB  
- node 0 free: 63787 MB  
- node distances:  
  - node 0 0: 10  

From `/proc/meminfo`  
- MemTotal: 65809500 kB  
- HugePages_Total: 0  
- Hugepagesize: 2048 kB

---

From `/etc/*release* /etc/*version*`  
- `os-release:`  
  - NAME="SLES"  
  - VERSION="15"  
  - VERSION_ID="15"  
  - PRETTY_NAME="SUSE Linux Enterprise Server 15"  
  - ID="sles"  
  - ID_LIKE="suse"  
  - ANSI_COLOR="0;32"  
  - CPE_NAME="cpe:/o:suse:sles:15"

`uname -a:`  
- Linux ml30-sles15 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)  
- x86_64 x86_64 x86_64 GNU/Linux

(Continued on next page)
Platform Notes (Continued)

Kernel self-reported vulnerability status:

- CVE-2018-3620 (L1 Terminal Fault): No status reported
- Microarchitectural Data Sampling: No status reported
- CVE-2017-5754 (Meltdown): Mitigation: PTI
- CVE-2018-3639 (Speculative Store Bypass): Vulnerable
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization Speculation, IBPB, IBRS_FW
- CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted

run-level 3 Oct 4 17:04

SPEC is set to: /home/cpu2017_u4

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   344G   64G  281G  19% /home

From /sys/devices/virtual/dmi/id
BIOS:    HPE U44 09/05/2019
Vendor:  HPE
Product: ProLiant ML30 Gen10
Product Family: ProLiant
Serial:  CN68130P0X

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory: 4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2667

(End of data from sysinfo program)

Compiler Version Notes

==================================================================================
|                                 | 600.perlbench_s(base) | 602.gcc_s(base) | 605.mcf_s(base) |
| C                                 | 625.x264_s(base)      | 657.xz_s(base) |

==================================================================================

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==================================================================================

C++ | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
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SPECspeed®2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>641.leela_s(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416</td>
</tr>
<tr>
<td>Copyright (C) 1985-2019 Intel Corporation. All rights reserved.</td>
</tr>
</tbody>
</table>

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
## SPEC CPU®2017 Integer Speed Result

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**CPU2017 License:** 3  
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**Test Date:** Sep-2019  
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**Software Availability:** May-2019

### Base Optimization Flags

**C benchmarks:**
- `-Wl,-z,muldefs`  
- `-xCORE-AVX2`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-qopenmp -DSPEC_OPENMP`  
- `-L/usr/local/je5.0.1-64/lib`  
- `-ljemalloc`

**C++ benchmarks:**
- `-Wl,-z,muldefs`  
- `-xCORE-AVX2`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`  
- `-lqkmalloc`

**Fortran benchmarks:**
- `-xCORE-AVX2`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=4`  
- `-nostandard-realloc-lhs`

The flags files that were used to format this result can be browsed at:
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html)  

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml)  